

## ENDOPHYTES

Endophytes are microorganisms present inside the plant which are not harmful to the plant, rather beneficial to plants for growth promotion and disease suppression.

*Bacillus* sp, an endophytic bacterium promotes growth by producing Indole 3-acetic acid and siderophore, solubilize phosphate, zinc, potassium and fix nitrogen. The bacteria can produce various exo-enzymes viz., chitinase,  $\beta$ -1,3 glucanase, cellulase, lipase, protease, amylase, xylanase and pectinase, which helps in fighting against plant pathogens.



## BIOCAPSULES

ICAR-Central Tuber Crops Research Institute and ICAR-Indian Institute of Spices Research, Kozhikode (ICAR-IISR) jointly developed biocapsule of this endophytic growth promoting bacterium by utilizing the commercialized encapsulation technology for the smart delivery of agriculturally important microorganisms. The technology involves encapsulation of the microorganisms of interest in a gelatin capsule for delivery to agricultural crops for the enhanced soil nutrient solubilization, enhanced growth, yield and suppression of disease.

## ADVANTAGES

- Smart and precise microbial delivery to crops
- Easy to handle and store
- High shelf life
- Production and storage at normal temperature
- Does not require sophisticated equipment for manufacture
- Green technology, totally eco-friendly
- Low production cost
- Maintains high microbial population

## DOSAGE AND APPLICATION

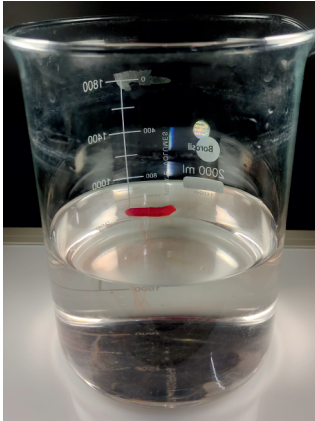
### Soil drenching

Put the capsule in one litre of water (boiled and cooled to room temperature) for two to three hours and mix thoroughly. Dilute the suspension to 100 litres and drench the soil @ 100 ml per mound, applied with well decomposed farmyard manure before planting.

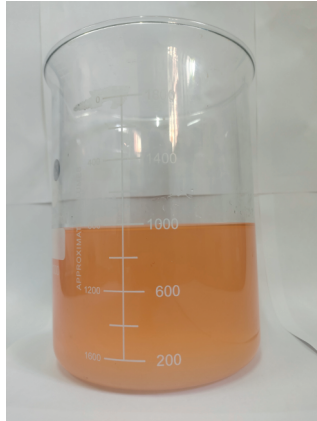
## Planting material treatment

Dip the seeds/roots of seedlings, setts or tubers in the above suspension as per the requirement for 10 minutes before planting and the remaining suspension could be used for drenching soil.

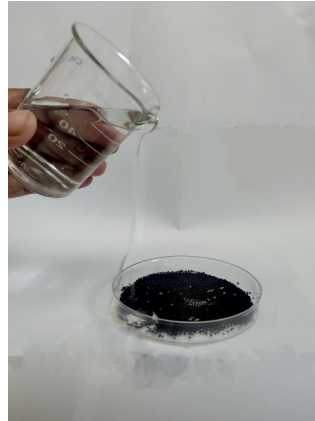
Initial dilution



Soaking of capsule and diluting to 1 litre



After diluted to 100 litres



Vegetable seed treatment



Drenching mounds before planting

**Ensure soil moisture during application and avoid application of any fertilizers and chemicals up to two weeks before and after the application of bacteria.**

The biocapsule is available at Farmers Facilitation Centre, ICAR- CTCRI @  
Rs. 100 + GST/capsule.

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## **Biocapsule of an endophytic *Bacillus* sp**

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